

Video captions

Video1: **HeliDye1** blinking inside *S. Aureus* upon background subtraction. A set of 1000 frames is shown in the video; full data contains set of 50 000 frames. Mathematical analysis of the full data set led to super-resolution image reconstruction (Fig. 7 and S18). Time is indicated. For better contrast and visibility, the video was thresholded and zoomed (original size of the video is 127×127 pixels).

Video2: Dimer of **HeliDye1** (*P*)-enantiomers inside the minor groove of dsDNA (from D1 model). This structure was used as starting conformation for DFT optimisation with subsequent ECD calculation.